Purple Loosestrife (*Lythrum salicaria*) in Ohio's Lake Erie Marshes

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ABSTRACT. Purple loosestrife (*Lythrum salicaria*) is an exotic plant from Eurasia that has displaced more than 50% of the plant biomass in some wetland communities in the U.S. Its dense stands provide poor waterfowl and muskrat (*Ondatra zibethicus*) habitat. True-color 35-mm photographs (slides) taken at 1,500 m were used to map the distribution of purple loosestrife in Erie, Lucas, Ottawa, and Sandusky Counties, where most of the purple loosestrife in Ohio occurs. We identified 213 stands (0.4-60.2 ha in size) that comprised 1,287 ha of purple loosestrife. Stands were associated with areas that have been inundated because of high Lake Erie water levels since 1975. Within the study area, only those marshes that undergo annual treatment of glyphosate or are cultivated contain no purple loosestrife.

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INTRODUCTION

Purple loosestrife (*Lythrum salicaria*) is an erect, perennial wetland herb that is native to Eurasia but is now nearly cosmopolitan in distribution (Shamsi and Whitehead 1974). The plant likely was introduced into the U.S. via seeds contained in sailing ship ballast that was dumped into east coast harbors (Stuckey 1980), although Hayes (1979) suggested that it might have been brought to America by bee-keepers. Presently, purple loosestrife is found in those of the contiguous 48 states north of the 35th parallel (southern border of Tennessee) except Montana; it is most common within the boundaries of the Wisconsin Glaciation (Thompson et al. 1987).

Effects on wildlife of invasion of wetlands by purple loosestrife have not been well studied (Thompson et al. 1987), although the dense stands that it usually forms provide poor waterfowl habitat (Smith 1964) and are avoided by muskrats and marsh wrens (*Cistothorus palustris*) (Rawinski and Malecki 1984). Thompson et al. (1987) reported that more than 50% of the plant biomass of some wetland communities has been displaced by purple loosestrife, and more than 1.25 million hectares of wetlands in seven North Central states are potential purple loosestrife habitat. Our objective was to rapidly and inexpensively document the occurrence of purple loosestrife in Ohio's southwest Lake Erie marshes so that further invasion of the plant can be easily quantified.

METHODS

True-color transparencies (35-mm slides) were obtained from the Agricultural Stabilization and Conservation Service (ASCS), who take aerial photographs (altitude about 1,500 m) of agricultural areas annually for crop inventory and inspection. These photos are taken during the peak of the purple loosestrife flowering season. At this time, purple loosestrife stands as small as 0.04 ha are visible on these photos as greenish-purple areas that often appear bumpy in texture because of the clumped growth habit of the plant (Balogh 1986). Slides taken in Erie, Lucas, Ottawa, and Sandusky Counties in 1984 were projected onto a planimeter pad at a scale of about 1:500. Purple loosestrife stands as small as 0.04 ha were visible on these projected images. Areas of loosestrife were digitized and the location and size of each stand were marked on U.S. Geological Survey (USGS) 1:24,000 scale topographic maps (Fig. 1). Visual truthing by low-altitude flights in fixed-wing aircraft was done during the flowering season of August of 1985 to improve accuracy of the maps.

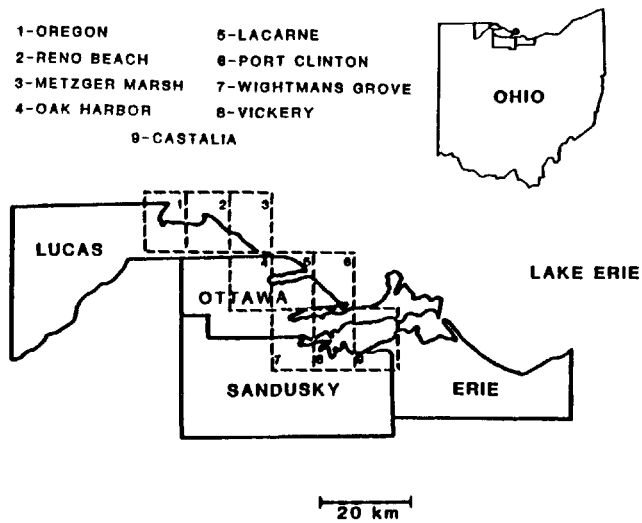

FIGURE 1. Four Ohio counties comprising the study area for this project, and the nine U.S. Geological Survey quadrangles that contained purple loosestrife stands greater than 0.04 ha in size.

RESULTS AND DISCUSSION

We identified 213 stands of purple loosestrife in the four-county study area (Fig. 2). Loosestrife stand size ranged from 0.4 ha (our lower limit of detectability on the aerial photographs) to 60.2 ha.

Notable concentrations of the plant occurred along the Little Portage River (Fig. 2, Wightmans Grove quadrangle), within the Resthaven Wildlife Area (Fig. 2, Castalia quadrangle), west of the Cedar Point section and Metzger Marsh section of the Ottawa National Wildlife Refuge (NWR) (Fig. 2, Reno Beach and Metzger Marsh quadrangles), and along the Portage River (Fig. 2, Port Clinton quadrangle). Some purple loosestrife stands growing near the Ohio Route 2/Sandusky Bay overpass (Fig. 2, Castalia quadrangle) were present at densities of 489,000 ± 53,000 stems per ha ($\bar{x}$ ± SE) (Balogh 1986), the highest stem density of adult purple loosestrife plants ever reported. Seventy percent of the loosestrife stands were within areas designated as wetlands on USGS 1:24,000 topographic maps (Table 1).

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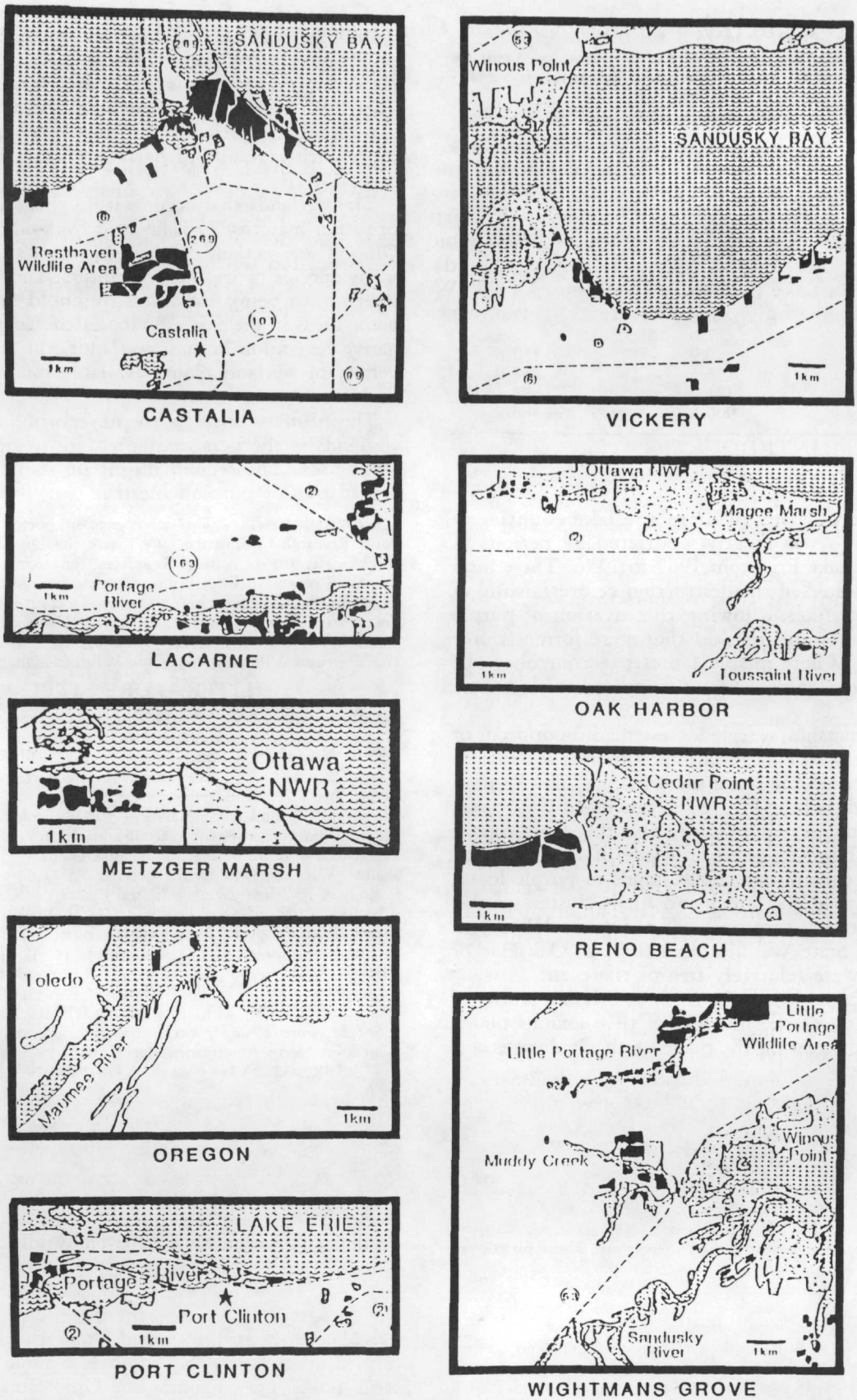

FIGURE 2. Locations of purple loosestrife stands within portions of the Castalia, Lacarne, Metzger Marsh, Oak Harbor, Oregon, Port Clinton, Reno Beach, Vickery, and Wightmans Grove quadrangles. Black polygons indicate the location and approximate size of areas infested with purple loosestrife during 1984 as determined from inspection of 35-mm, true-color aerial photographs.

TABLE 1

Distribution of purple loosestrife in nine U.S. Geological Survey (USGS) quadrangles within Erie, Lucas, Ottawa, and Sandusky Counties, Ohio, from 35-mm, true-color aerial photographs, July and August 1984.

USGS quadrangle	Purple loosestrife in wetland sites (ha)	Purple loosestrife in non-wetland sites (ha)
Castalia	454.4	386.2
Lacarne	164.9	18.1
Metzger Marsh	39.9	46.6
Oak Harbor	9.5	0.0
Oregon	0.0	17.0
Port Clinton	7.0	5.3
Reno Beach	6.9	152.8
Vickery	56.3	53.0
Wightmans Grove	161.9	73.1
Total	900.8	386.2

Colonization of this plant in the lake counties of northwest Ohio was greatly facilitated by periods of high water in Lake Erie from 1969 to 1976. These high lake levels resulted in the destruction or overflowing of many wetland dikes, allowing the invasion of purple loosestrife seeds into marshes that were formerly free of the plant. Where purple loosestrife control is not practiced, the plant continues to spread within wetland units.

In certain marshes, purple loosestrife did not occur or was not present in concentrations sufficiently dense to allow detection on the aerial photographs. The Winous Point Shooting Club (Fig. 2, Wightmans Grove and Vickery quadrangles) and Ottawa Shooting Club, opposite Winous Point on the south side of Muddy Creek Bay, did not contain detectable stands of purple loosestrife, although single stems and small clusters of this plant were present. Large sections of Ottawa NWR and Magee Marsh State Wildlife Area (Fig. 2, Oak Harbor quadrangle) were relatively free of the plant as well. The lack of purple loosestrife in these marshes attests to effective control of the invasion of this noxious plant, usually by spot treating the plants with glyphosate herbicides.

A discussion of control strategies for purple loosestrife is beyond the scope of this paper. Spraying with glyphosate is the only effective herbicide treatment. However, glyphosate is non-selective and expensive. Therefore, treating large marsh units is neither practical nor desirable, particularly if purple loosestrife is scattered within stands of native vegetation (Thompson et al. 1987).

The wetlands that occur within this study area comprise the majority of Lake Erie wetlands remaining in Ohio. These wetlands are an important stopover area for many species of waterfowl, raptors, and passerines, in addition to being the last stronghold for marsh nongame birds in the state. As loosestrife encroaches on the native vegetation in these wetlands, the amount and diversity of wetland plants available for food and cover decline.

The primary obstacle to preservation of freshwater wetlands is the persistent pressure to drain them for other uses. The second might be their invasion and degradation by purple loosestrife.

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